Amendments to the claims:

1.-42. (Canceled)

43. (Previously presented) A device comprising a first polymer substrate layer having a plurality of mesoscale channels fabricated thereon, which first polymer substrate layer is overlaid by a cover layer, which cover layer comprises a transparent portion, whereby the plurality of channels are sealed between the first polymer substrate layer and the cover layer.

44. (Previously presented) The device of claim 43, wherein the cover layer and the first substrate layer are adhered.

45. (Previously presented) The device of claim 43, wherein the first polymer substrate is formed by molding the polymeric substrate.

46. (Previously presented) The device of claim 43, wherein the cover layer comprises glass.

47. (Previously presented) The device of claim 43, wherein the cover layer comprises a material other than glass.

48. (Previously presented) The device of claim 43, wherein the cover layer comprises a plastic.

49. (Previously presented) The device of claim 43, wherein the cover layer comprises a plastic sheet.

50. (Previously presented) The device of claim 43, wherein the flow channels are fabricated on the first substrate by at least one of spin coating and vapor deposition, photolitography, wet chemical etching and plasma processing.

51. (Previously presented) The device of claim 43, further comprising a second cover layer bonded to the first substrate.

52. (Previously presented) The device of claim 43, wherein the plurality of channels intersect at a plurality of intersections.

53. (Previously presented) The device of claim 43, wherein the channels are between about 0.5 and 500 microns in at least one channel dimension.

54. (Previously presented) The device of claim 43, wherein the channels are between about 2 and 500 microns wide and between 0.1 and 500 microns deep.

55. (Previously presented) The device of claim 43, further comprising a sample inlet port coupled to at least one of the plurality of channels.

56. (Previously presented) The device of claim 43, further comprising at least one source of at least one biological material.

57. (Previously presented) The device of claim 56, wherein the biological material comprises at least one of blood, plasma, serum, urine, sputum, saliva, cells and antibodies.

58. (Previously presented) The device of claim 56, wherein the at least one source of at least one biological fluid is connected to a sample inlet port, which sample inlet port is coupled to at least one of the plurality of channels.

59. (Previously presented) The device of claim 43, further comprising an appliance, the appliance comprising a nesting site for receiving the first substrate when overlayed by the transparent cover layer.

60. (Previously presented) The device of claim 59, the appliance comprising a conduit for delivering source of material to at least one of the plurality of channels.

61. (Previously presented) The device of claim 59, the appliance comprising an injector for injecting a sample into contact with at least one of the plurality of channels.

62. (Previously presented) The device of claim 61, wherein the injector is a pressure injector and the appliance further comprises a pressure detector.

63. (Previously presented) The device of claim 59, wherein the cover layer comprises a sample inlet port fluidly coupled to at least one of the plurality of channels, the appliance comprising a flow line coupled to the sample inlet port.

64. (Previously presented) The device of claim 59, further comprising one or more valves in the appliance or in contact with one or more of the plurality of channels, which one or more valves regulates fluid flow.

65. (Previously presented) The device of claim 43, further comprising means for sample movement.

66. (Previously presented) The device of claim 43, further comprising means for reagent movement.

67. (Previously presented) The device of claim 43, further comprising a detection region within at least one of the channels.

68. (Previously presented) The device of claim 43, further comprising a conductivity sensor in at least one of the channels.

69. (Previously presented) The device of claim 43, further comprising a pressure sensor in at least one of the channels.

70. (Previously presented) The device of claim 43, further comprising an optical detector proximal to channel for detecting an optically detectable moiety within the channel.

71. (Previously presented) The device of claim 70, wherein the optical detector comprises a spectroscope.

72. (Previously presented) The device of claim 70, wherein the optical detector comprises a microscope.

73. (Previously presented) The device of claim 70, wherein the optical detector comprises a light source.

74. (Previously presented) The device of claim 70, wherein the optical detector comprises a camera.

75. (Previously presented) The device of claim 70, wherein the optical detector detects a fluorescent or luminescent signal in a detection region coupled to or within a channel of the device.

76. (Previously presented) The device of claim 43, further comprising a tilting mechanism for tilting the first substrate when overlaid by the cover layer.

77. (Previously presented) The device of claim 43, further comprising a detection region within at least one mesoscale channel or chamber of the device, the detection region comprising a polymer bead disposed therein.

78. (Previously presented) The device of claim 43, further comprising a plurality of electrical contacts configured to resistively heat a portion of the first substrate.

79. (Previously presented) The device of claim 43, further comprising temperature control means for controlling the temperature of a portion of the device.

80. (Previously presented) The device of claim 43, further comprising an inlet port and a source of a plurality of sample materials, which, during operation of the device, are flowed through the inlet port and into at least one of the plurality of channels.

81. (Previously presented) The device of claim 43, the device further comprising an inlet port and a plurality of source of separate sample materials, which, during operation of the device, are flowed through the inlet port and into at least one of the plurality of channels.

82. (Canceled)

83. (Previously presented) The device of claim 43, wherein the first substrate and cover layer are each between 0.2 and 2 centimeters square.

84. (Previously presented) The device of claim 43, wherein the first substrate is manufactured from a polytetrafluoroethylene.

85. (Previously presented) The device of claim 43, wherein the total volume of the plurality of channels is less than 10 microliters.

86. (Previously presented) The device of claim 43, wherein the channels comprise at least one surface coating.

87. (Previously presented) The device of claim 43, further comprising a magnetic bead disposed within one or more of the plurality of channels.

88. (Previously presented) The device of claim 87, further comprising a magnetic field source of directing movement of the magnetic bead.

89. (Previously presented) The device of claim 43, wherein at least one of the channels varies in width along the length of the at least one channel.

90. (Previously presented) The device of claim 43, further comprising a pump coupled to a port coupled to at least one of the plurality of channels.

91. (Previously presented) The device of claim 43, further comprising reagents for PCR amplification within the channels of the device.

92. (Previously presented) The device of claim 43, further comprising a microprocessor coupled to a detector which is mounted proximal to the cover layer.

93. (Previously presented) The device of claim 43, wherein the plurality of channels comprise at least one sample and at least one control region.

94. (Previously presented) The device of claim 43, further comprising a microprocessor coupled to a detector which is mounted proximal at least one sample and at least one control region, which microprocessor compares data from the sample and the control region.